

Hydrologic Engineering Center

Training Course on

**WATER QUALITY MANAGEMENT**

Davis, California

Content and Objectives

The course objective is to overview reservoir-watershed relationships; reservoir and tailwater characteristics and processes; aquatic ecology; water quality assessment techniques; and data interpretation. Participants will be introduced to mathematical models and other technology useful in water quality assessment and management.

Students will participate in case studies on the application of assessment and management techniques. Water quality problem identification, anticipation, and improvement will be included. A discussion of current issues and topics relevant to water quality management and water control will be included.

## River and Reservoir Water Quality Concepts

8:00- 9:10 a.m. **INTRODUCTION**

9:10- 9:20 a.m. Break

9:20-10:30 a.m. 1.1 Lecture

### **RIVER & RESERVOIR - PHYSICAL & CHEMICAL WATER QUALITY**

Physical and chemical factors of riverine water quality will be discussed including such things as watershed influences, stream types, velocity, hydrographs, turbidity, sediment load, gas transfer, seasonal influences, point/nonpoint sources, nutrient processes, assimilative capacity, and urban runoff as related to the integrity of the stream ecosystem. Also, discuss effects of flood control, hydro, navigation, and tailwater ecology - design and management.

Physical and chemical factors that influence the reservoir environment will be discussed including, retention, basin concepts, reservoir & basin morphology, temperature/density, sediment/turbidity, gas exchange, mixing/season cycles, H&H considerations, BOD, nutrient cycles, oxidation reduction potential, metals, contaminants, SOD

10:40-11:50 a.m. Lecture 1.1

### **RIVER & RESERVOIR - PHYSICAL & CHEMICAL WATER QUALITY (continued)**

11:50- 1:00 p.m. **ICE BREAKER LUNCHEON**

1:00- 1:50 p.m. 1.2 Lecture

### **RIVER & RESERVOIR - BIOLOGY**

Biological characteristics of water bodies, especially how they differ from streams and lakes, including, algae, benthos, bacteria, submerged aquatic vegetation, fisheries, macrophytes, habitat, eutrophication.

2:00- 2:50 p.m. 1.2 Lecture

### **RIVER & RESERVOIR - BIOLOGY (continued)**

3:00- 3:50 p.m. 1.3 Lecture

### **NUMERICAL MODELING OVERVIEW**

Overview of available numerical models for both reservoir and riverine environments Demonstrate EPA's CD-Rom capabilities.

4:00- 5:00 p.m. **NUMERICAL MODELING OVERVIEW (continued)**

## Water Quality Data Collection & Management Techniques

8:00- 8:10 a.m.. Coordination

8:10- 9:10 a.m. 2.1 Lecture **DATA COLLECTION AND EQUIPMENT**

Data collection techniques, and field equipment will be discussed.

9:10- 9:25 a.m. Break

9:25-10:25 a.m. 2.2 Lecture **DATA ANALYSIS AND MANAGEMENT**

Data storage, analysis, data display, and interpretation to meet study objectives. The Corps's EQUIS data storage system will be discussed. Brief discussion of QA/QC importance.

10:35-11:35 a.m. 2.3 Lecture **CORPS ENVIRONMENTAL POLICY**

Civil Works Guidance, Estuarine and Coastal Environmental Work, WOTS, DOTS, R&D and HTW will be discussed.

11:35-12:35 p.m. Lunch

12:35- 5:00 p.m. Field Trip **DATA COLLECTION AND BIOLOGICAL OBSERVATION**

Demonstrate data collection and biological observation techniques in a local stream and backwater area.

## Case Studies and Workshop

8:00- 8:10 am: Coordination

8:10- 9:10 a.m. 3.1 Lecture

### **RESERVOIR RELEASE STRATEGIES & RESPONSE TO EMERGENCIES**

Integrating water quality considerations into water control decision process. Response to emergencies such as spills and fishkills.

9:10- 9:25 a.m. Break

9:25-10:20 a.m. 3.2 Lecture

### **CASE STUDY OF THE CLARION RIVER SYSTEM**

Reservoir system operation considerations on the Clarion River System in light of conflicting resource demands.

10:30-11:30 a.m. 3.2 Lecture

### **CASE STUDY OF THE CLARION RIVER SYSTEM (continued)**

11:30-11:40 a.m. Class Photo

11:40-12:40 p.m. Lunch

12:40- 1:40 pm 3.3 Lecture

### **CASE STUDY ON OHIO RIVER WATER MANAGEMENT TECHNIQUES**

Water management techniques currently used in district offices.

1:50- 2:45 p.m. 3.3 Lecture

### **CASE STUDY ON OHIO RIVER WATER MANAGEMENT TECHNIQUES (continued)**

2:55- 5:00 p.m. 3.3 Workshop

### **WATER MANAGEMENT TECHNIQUES AND WATER RESOURCE SYSTEMS OPERATIONS**

Individuals will participate in a group solution to questions posed during the two previous case studies and prepare a presentation for the class regarding that solution.

6:45- 8:30 p.m. Evening Talk

### **LAKES OF THE WORLD**

8:00- 8:10 a.m: Coordination

8'10-10:00 a m Review

**WATER MANAGEMENT TECHNIQUES AND  
WATER RESOURCE OPERATIONS**

Groups will present their solution to the problems provided in the case studies presented the previous day.

10:00-10:20 a.m. Break

10:20-11:45 <sup>a.m.</sup> 4.1 Lecture

**HEC-5Q OVERVIEW**

Concepts of the HEC-5Q computer program will be explained including an overview of input and output. (Willey)

11:45-12:45 p.m: Lunch

12:45- 1:45 p.m. 4.1 Lecture

**HEC-5Q OVERVIEW (continued)**

2:00- 2:50 p.m. 4.2 Lecture

**HEC-5Q APPLICATION**

Apply MENU5Q, COED, HEC-5Q, AND DSPLAY on a practical data set from a Corps project.

3:00- 3:50 p.m: 4.2 Lecture

**HEC-5Q APPLICATION (continued)**

4:00- 5:00 p.m. Coordination/Test/Review

8:00- 8:50 a.m. 5.1 Lecture

**WETLAND WATER QUALITY MANAGEMENT**

Discuss management and modeling of wetlands.

9:00-10 00 a.m. 5.1 Lecture

**WETLAND WATER QUALITY MANAGEMENT  
(continued)**

10:20-11:30 a.m. **COMPLETION ACTIVITIES**